AMD DEVELOPER symposium 2002

Driving Linux on AMD into the Enterprise

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Agenda

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- Early years of Linux
- Linux today
- Athlon and Hammer
- Future of Linux on AMD
- Q&A
- Closing remarks

Early years of Linux

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- Linux invades enterprise through the back door
- Usually low impact, skunkworks projects
- Offered good reliability for
  - web servers
  - infrastructure tasks (file/print/mail servers)
- Low cost
  - Minimal cost for OS
  - Open source easily customizable
  - Could run on older equipment
- Linux zealot usually behind the project
- Dec 2000: IBM plans to spend $1B on Linux in 2001

Linux now—significant but isolated

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- 20% servers sold in 2001 had Linux preinstalled
- Mostly confined to web and infrastructure servers
  - Entire stack is OSS
- Has gained support of UNIX and PC server vendors
  - Tier 1 vendors lend credibility
  - Also strengthen product offering
- Gaining important enterprise software support
  - Oracle
  - SAP

Athlon™

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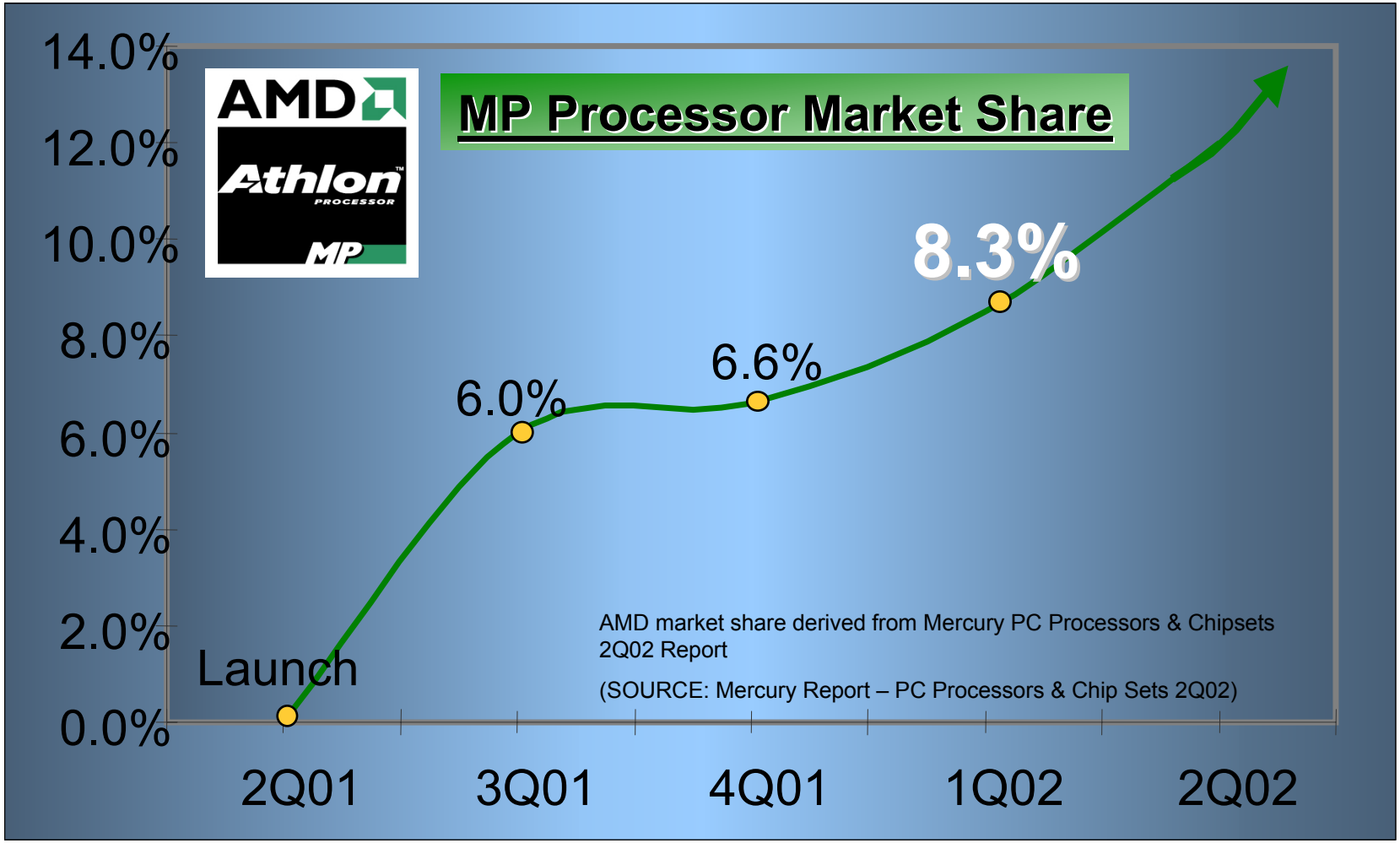
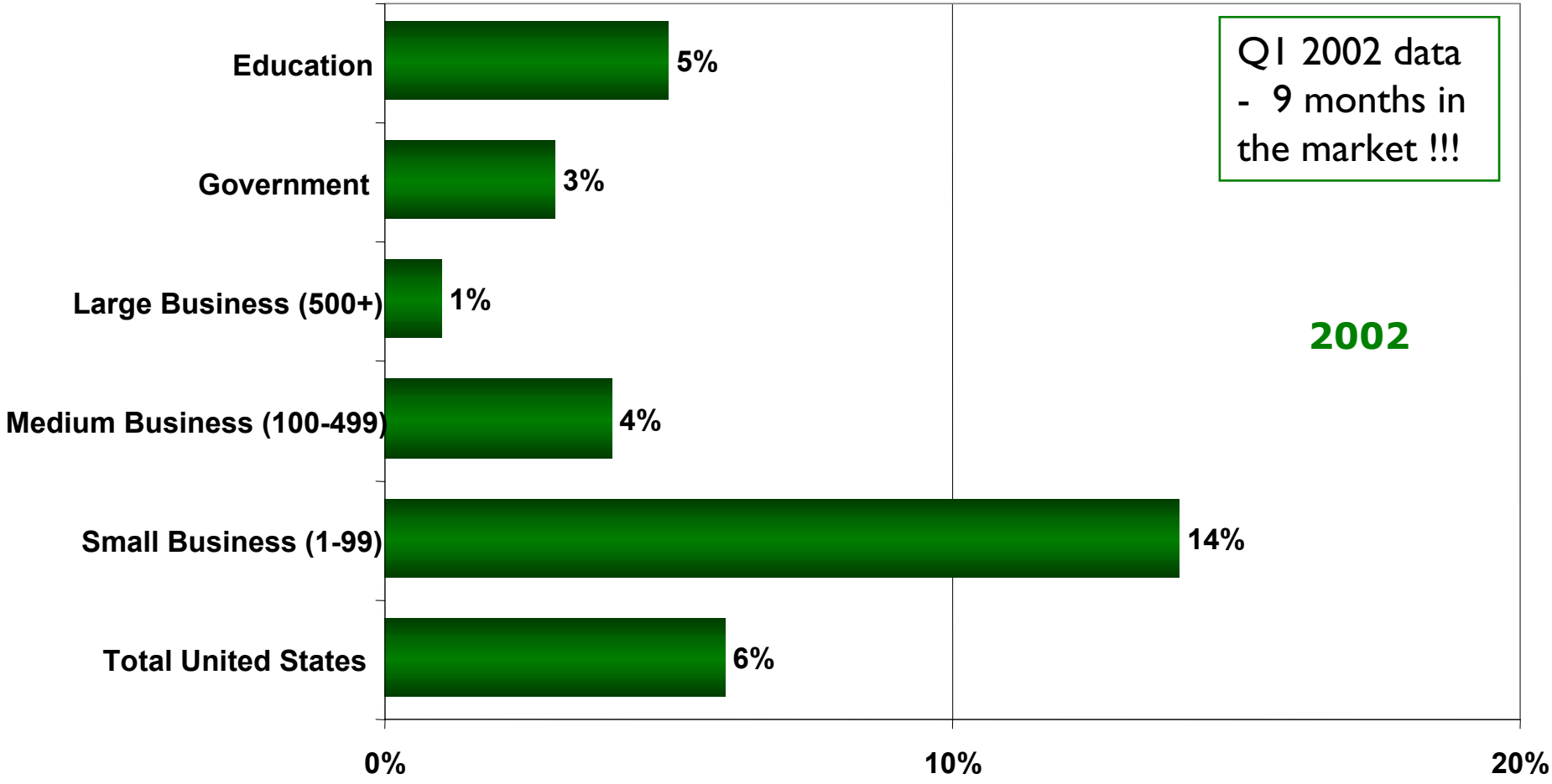
- World-class performance at a great price
- Accounts for over 20% of worldwide processor sales
- Entire infrastructure developed
  - New front side bus architecture and chipset support
  - DDR Memory
  - Motherboards, power supplies, etc.
- Initially desktop
  - Added mobile, workstation, and server

AMD Athlon™MP Processor Market Share



AMD U.S. Server Market Share By End User Segment



Source: Dataquest Quarterly Statistics, 1Q Edition, May 2002
Data is based upon shipments of Windows®-based PC Systems

Hammer Technology

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- Improved processor core
- Integrated memory controller
- HyperTransport™ I/O interface
- World class 32-bit x86 processor
- x86-64 is planned to commoditize 64-bit computing

Linux on Hammer Processors

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- Linux and Hammer together are the ultimate value proposition
- Excellent performance on 32-bit software
- x86-64 architecture
  - Reasonable migration to 64-bit computing
  - Based on x86 architecture
  - 32-bit compatibility at speed
- Infrastructure support at launch
- Hammer is planned to set a new standard for performance

Future of Linux—challenges and opportunities

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- Enterprise divided into four market segments
  - Web and infrastructure servers
  - Front-office/back-office servers
  - Workstations and HPC
  - Desktops
- Different strengths and challenges for Linux per segment

Web and infrastructure servers

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- Critical mass has been achieved and growth is expected to be self-sustaining
- Server consolidation
- Main obstacle is incumbency of Windows®
  - Lack of in-house Linux expertise
  - Unwillingness to change something that's working
- Gartner predicts significant gains of Linux over UNIX while Windows sales remain flat

Front-office and back-office servers

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- Harder nut to crack
  - IT management demands proof of stability, continuity, scalability, and predictability
  - Cost of failure much greater than cost of system
  - Failure of a mission-critical Linux server could be career limiting
- Potential savings with Linux dwarfed by hardware, software, and consulting costs
- Starting to gain support of enterprise software vendors
  - Oracle
  - SAP
  - IBM
- Hammer will scale-up and scale-out

Workstations

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- Minimal impact so far in CAD/CAE
- Opportunities to take share from Solaris
- Horsepower biggest issue with workstation market
  - Small consumption of resources by Linux significant advantage over Windows® operating system
- Applications are floating-point and graphics intensive
  - AMD Athlon™ and Hammer processors have great floating-point performance
  - Most workstation apps bumping against 2GB limit
  - Hammer designed to support AGP 8X
- Availability of closed-source software is critical
- High-price of application software dwarfs Linux savings

HPC and DCC

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- Render farms and compute clusters
- Actually servers running workstation apps
- Exploits Linux clustering
- Often exists in heterogeneous environments
- Requires almost infinite floating-point bandwidth
- Purchased at workgroup level

Corporate Desktops

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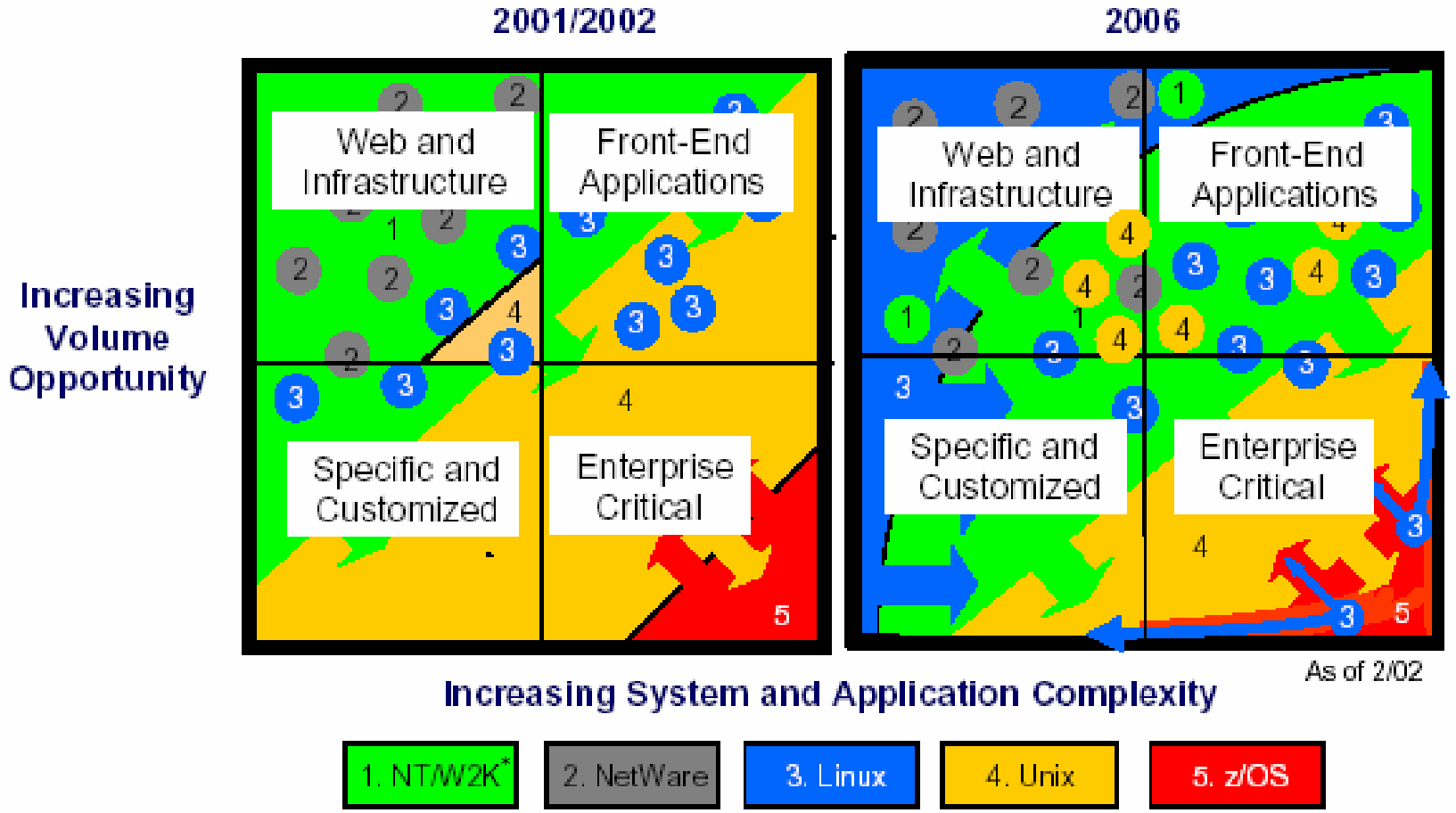
- Big target, big challenge
  - Where's the revenue opportunity?
- Lower cost of desktop system means Linux/Hammer combo saves larger percentage of system cost than for servers or workstations
- OSS apps makes an additional cost difference
- Interoperability a major roadblock
- Big opportunity in emerging economies
  - Cash savings paramount
  - Interoperability not as much an issue

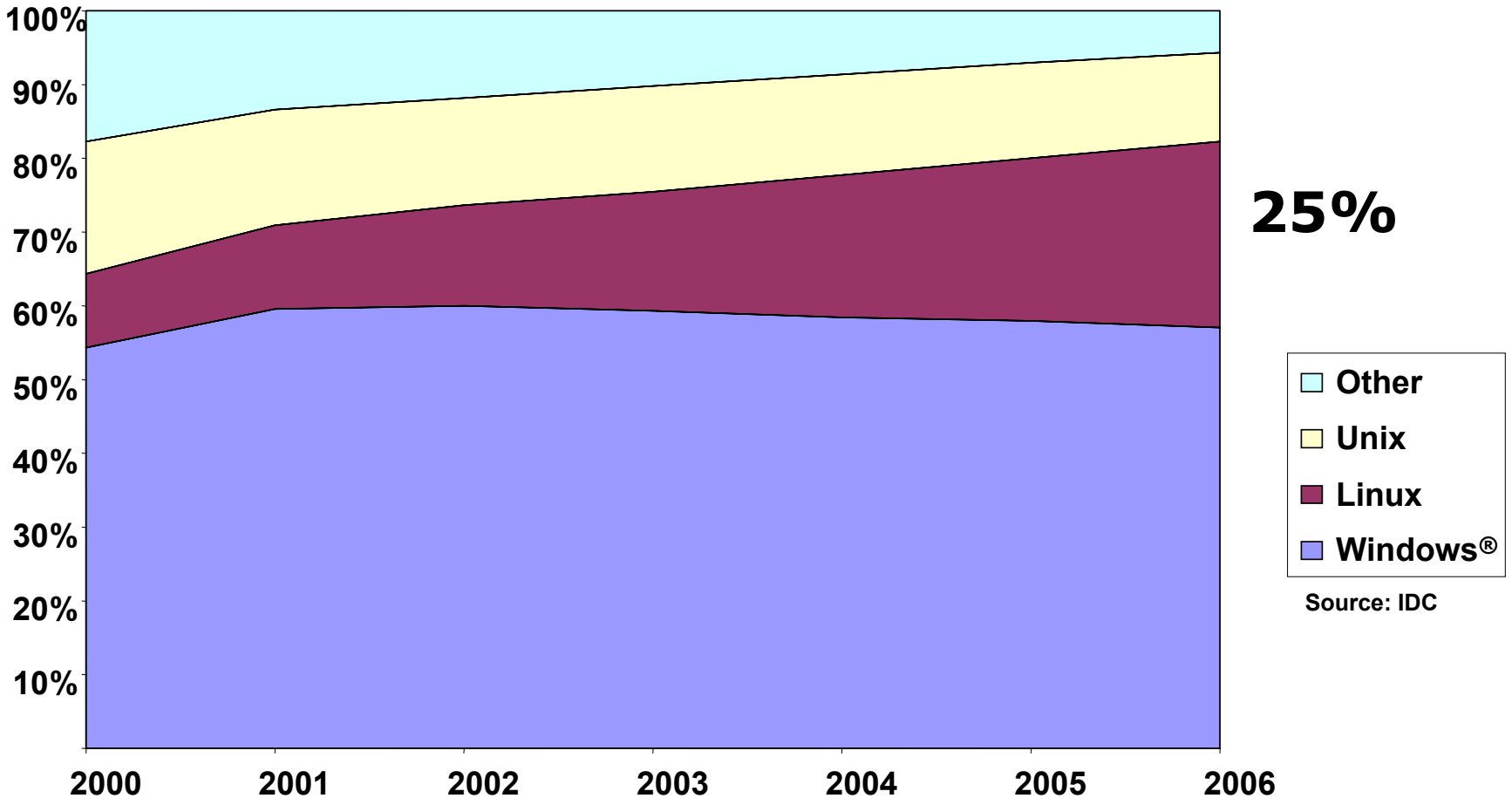
Linux enterprise growth



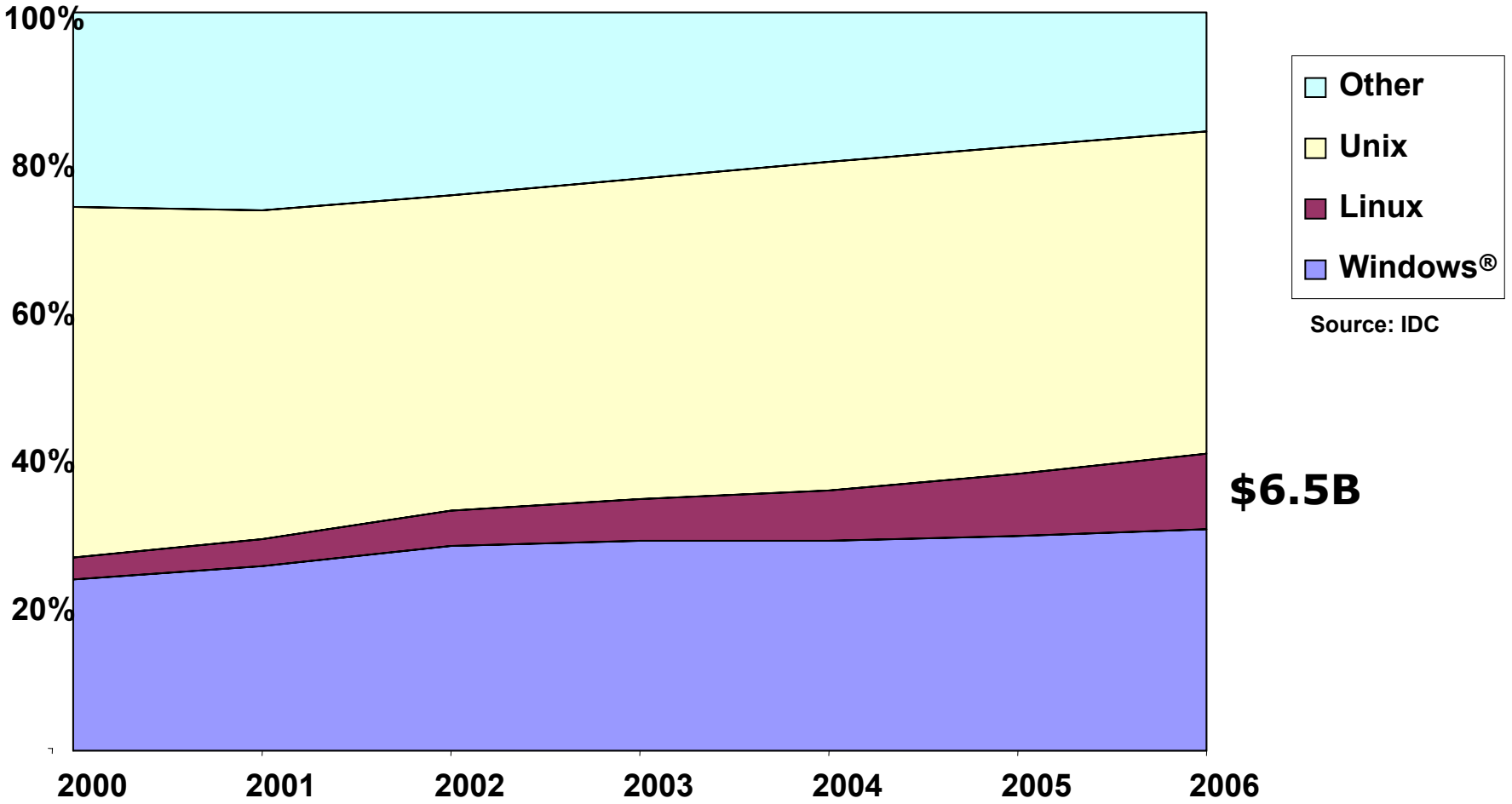
Source: Gartner Research

*Windows® NT/Windows 2000

Server Units by OS



Server OS Revenue



Encouraging growth of Linux in the enterprise

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- Embrace x86-64 technology
- Resolve security issues
- Increase ISV support
- Look at high-growth regions
- Partner creatively

Porting to x86-64

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- Millions of 64-bit capable processors implementing x86-64 technology are planned to ship in 2003
- 64-bit Linux
  - Linux-64 from SuSE in beta
  - Distributions through major vendors planned to be available in 2003
- Port applications that make sense
  - Technology demo
  - Productize
- Ensure driver availability
- 32-bit application compatibility at speed

Linux security a concern

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- Linux dominance of Web and infrastructure servers depends on being more secure than Windows®
- Linux has had an aura of better security than Windows
- As success increases, Linux becomes a more tempting target
- Open source helps hackers
- Server vendors key in adding closed-source security measures

ISV support

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- Don’t duplicate UNIX fragmentation
- Linux Standard Base may be part of the solution
  - Minimize testing effort
  - ISV involvement currently weak
- ISVs need to see value proposition

High growth regions

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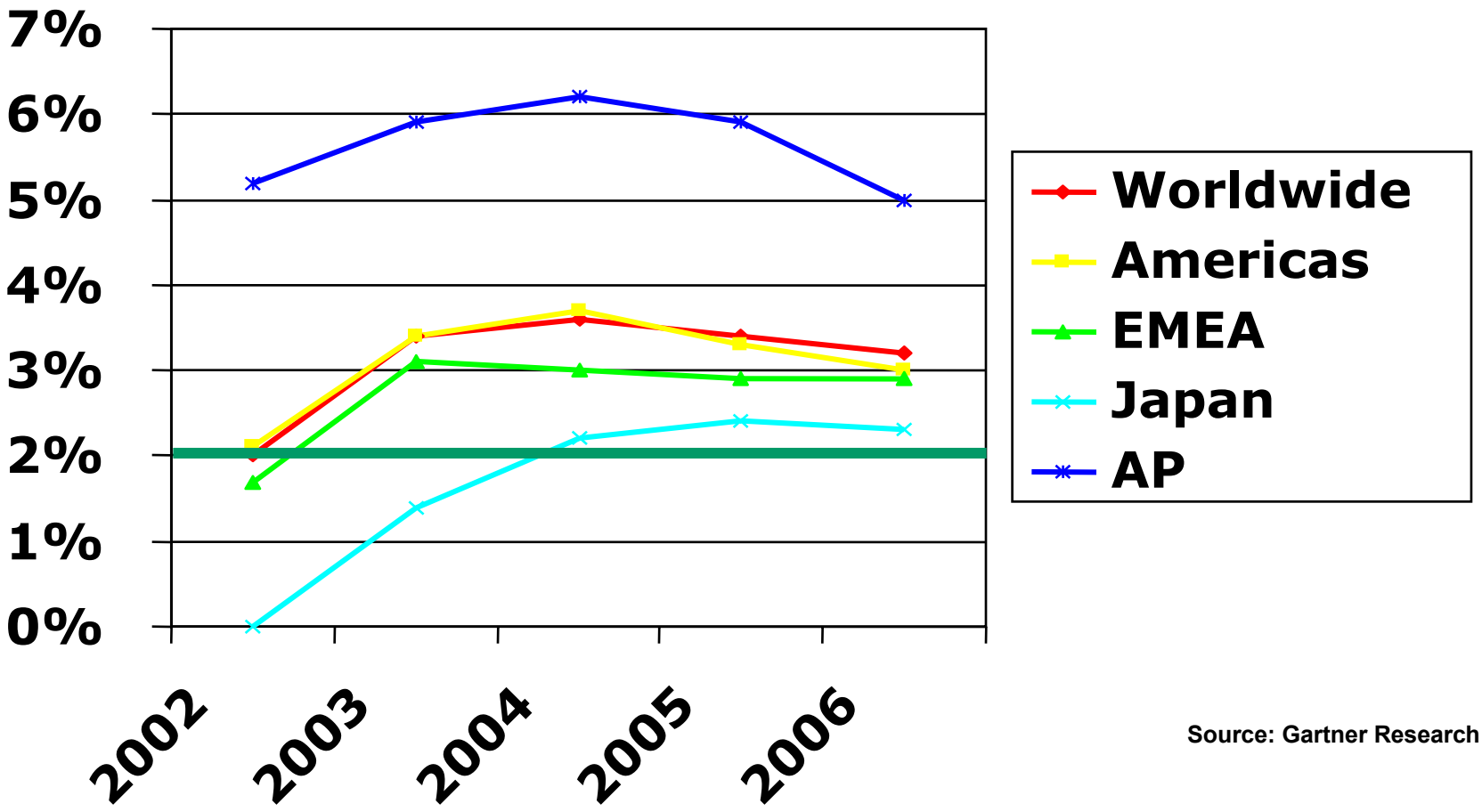
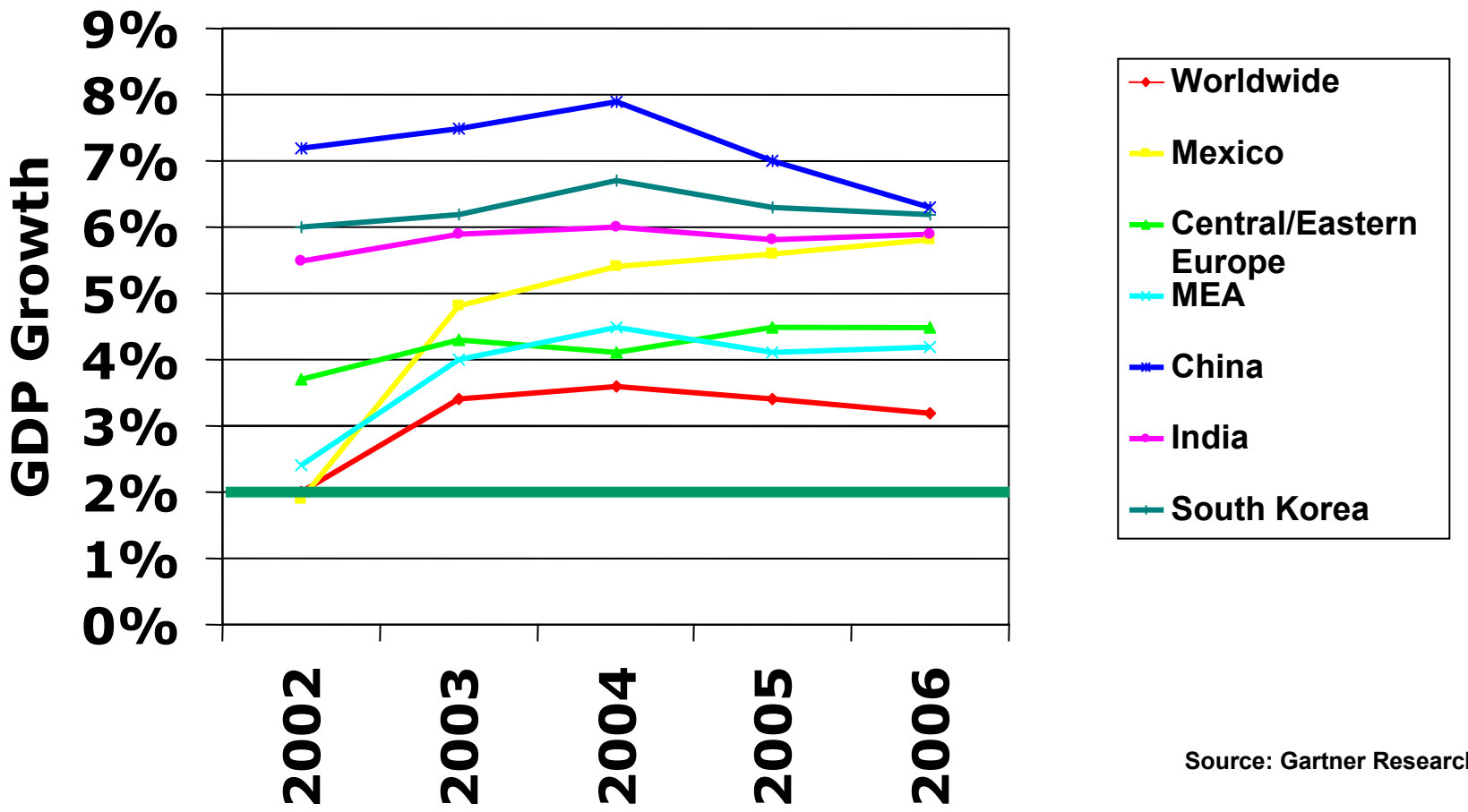
- Tend to be emerging economies with excellent opportunities for Linux on desktop as well as Linux servers
- Fewer compatibility issues
- More cost sensitive
- Less incumbency

GDP Growth by region



Source: Gartner Research

High growth countries



Source: Gartner Research

Creative Partnering

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- Look for win-win situations
- Think outside the box
- AMD/SuSE agreement to create Linux-64 for Hammer
- Red Hat/Oracle created Red Hat Linux Advanced Server
- Recent IBM/Red Hat deal

Q & A

Summary

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- Hammer planned to commoditize 64-bit computing
- 64-bit Linux and other OSS planned to be available for Hammer in 2003
- ISV support for x86 and x86-64 required
- Look at high growth regions
- Creative partnering

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